Center Independent Research & Development: GSFC IRAD

Decomposing Nitrous Oxide Thruster using Dielectric Barrier Discharge Project

Completed Technology Project (2011 - 2012)

Project Introduction

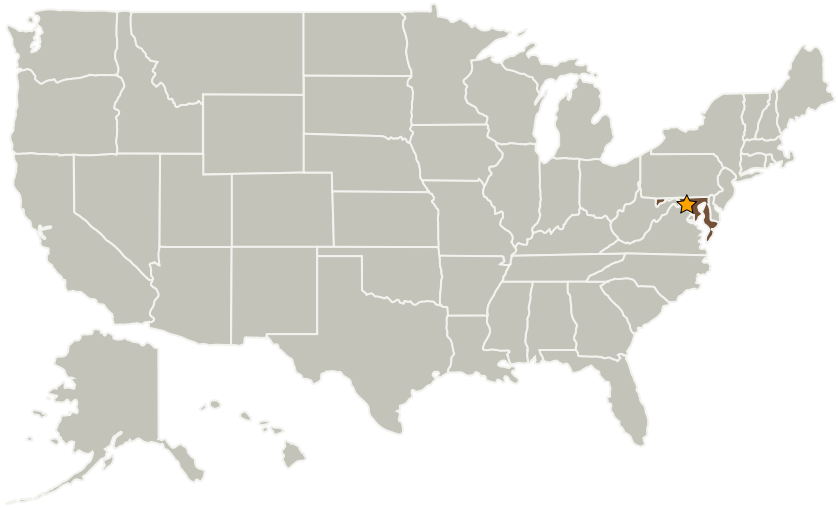
One of NASA's Grand Challenges is to design more efficient propulsion systems. The decomposing nitrous thruster with a dielectric barrier discharge is only one step away from the simplicity of cold gas thrusters, yet offers a theoretical Isp of 200 seconds – closer to the performance of monopropellant technologies.

The University of Maryland is proposing to use a dielectric barrier discharge (DBD) as a means to dissociate N2O. DBD uses alternating high voltage differences between two electrodes to create strong electric fields. One or both of the electrodes is covered in a dielectric, and a gap in between allows gas to pass through. Nitrous Oxide sent through the gap between the electrodes has its free electrons accelerated by the large E-field, and in the process the electrons collide with N2O molecules.

Anticipated Benefits

Small spacecraft with low power budgets and small Delta V requirements

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
University of Maryland-College Park(UMCP)	Supporting Organization	Academia	College Park, Maryland

Primary U.S. Work Locations
Maryland

Project Website:

http://aetd.gsfc.nasa.gov/

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

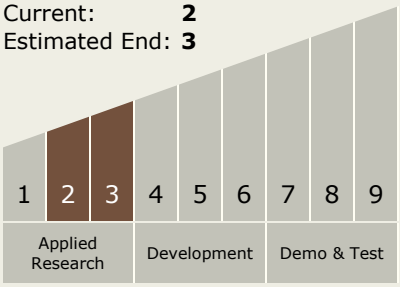
John C Adams

Principal Investigator:

Eric H Cardiff

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.7 Cold Gas